BERMUDA

REPORT

of the

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16 MAY 1935
INSTITUT

DEPARTMENT

of

AGRICULTURE

for the Year

1934

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Board of Agriculture, 1934

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Department of Agriculture, 1934

Director of Agriculture, E. A. MCCALLAN.
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Horticulturist, J. C. NAUEN.
Inspector of Produce, T. ARTHUR HOLLIS.
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PART-TIME OFFICERS.

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Assistant Inspector of Produce, C. V. S. EARLY.
Sub-Inspectors of Produce, J. W. M. GIBBONS, E. G. WHITBREAD, A. W. B. FOWLE, E. L. ADAMS.

LETTER OF TRANSMISSAL.

Agricultural Station,
Paget East, Bermuda,
2nd April, 1935.

Sir,

I am directed by the Board of Agriculture to lay before His Excellency the Governor, for the information of the Legislature, the accompanying reports of the Department of Agriculture for the year ended 31st December, 1934.

I have the honour to be,

Sir,

Your obedient servant,

HILDA C. LINES,

Clerk, Board of Agriculture.

The Honourable,
The Colonial Secretary,
Hamilton.

Director's Retiring Report

The Chairman,
The Board of Agriculture.

Acting on instructions received from the Colonial Secretary, I have the honour to present my retiring report covering the period 1st January, 1921, to 31st December, 1934.

The Department of Agriculture was created by the Agricultural Act of 1913. Mr. E. J. Wortley, F.G.S., M.B.E., held the post of Director from 1st January, 1913, to 30th September, 1920, and I from 1st October, 1920, to 31st December, 1934; Mr. W. R. Evans, Agricultural Assistant, was appointed Acting Director during the last five months of 1934 during which time I was on vacation prior to voluntarily retiring at the minimum age of sixty.

I propose to deal briefly with the chief activities of the Department during the twenty-one years named above.

BETTER SEEDS.

It was evident to the Department in 1913 that much loss was occasioned farmers by the importation of numerous varieties of vegetable seeds, many of which were unsuitable for local planting. In September, 1913, a bulletin, "Varieties of Vegetables Suitable for Growth in Bermuda", was issued, in which were given varieties then recommended by leading farmers. In 1918 the bulletin, "Hints on Growing Vegetables", contained fewer varieties recommended in the light of tests made at the Station during the intervening years, and in the varieties subsequently named in the monthly Agricultural Bulletin and other publications further eliminations and substitutions were from time to time recommended in the light of further experience gained in the experimental plots and on farms.

In 1920 Teneriffe was visited in the interests of onion growers, and California in 1926, and as a result of the selections made annually during the following eight years a more highly yielding and uniform strain was developed. In 1932 similar selection work was begun with carrots.

In 1924 a visit to the seed establishment of Monsieur L. Clause, Bretigny-sur-Orge, France, established the identity of that firm's Golden Self-blanching celery as a highly suitable strain, and the rapid increase in celery exports during the years immediately following were largely due to the almost exclusive use of that strain, which later, however, gave way to Golden Plume or Wonderful.

It is regretted that two varieties of vegetables were recommended before being fully tested, for the work as a whole was of great value to vegetable growers.

The improvement of seed potatoes claimed early attention in 1913, and for many years continued to be a major problem of the Department. Twenty-one years ago certified seed potatoes were unknown, and the early work of the Department was that of pioneers.

In 1913 Garnets grown from seed imported chiefly from Nova Scotia, and Triumphs from Long Island, N.Y., were alike badly infected with virus diseases. So poor was some of this seed that at times the yields in Bermuda were scarcely larger than the quantities of seed planted. In the Director's report for 1914-15 are given the yields from ten fields of Triumphs and ten of Garnets; the yields of the first averaged 2.2 barrels and of the second 1.4 barrels from each barrel planted; representative yields from the poor strains of that period.

Improvement was early affected in Garnets, though there were lapses from time to time. The improvement of Triumph seed proved a far more difficult task, and new sources of reliable seed were sought in many localities in Canada and the United States, and hundreds of samples were tested at the Station. In 1928, the use of seed grown by the Nebraska Certified Seed Potato Growers' Association was recommended by the Department, both for direct importation into Bermuda and for planting on Long Island to furnish seed for the main Autumn planting in Bermuda. For the last six years uniformly good results were secured from the seed imported direct, and the experience of the last two years (1933-1934) indicates that satisfactory freedom from virus diseases can be secured in Long Island-grown seed if the growers on "the island" plant in isolated fields in which potatoes were not grown the previous season.

In 1926 the Boyce Thompson Institute for Plant Research, Inc., Yonkers, N.Y., kindly permitted Dr. F. E. Denny to come to Bermuda to conduct at the Station experiments in the hastening of germination in dormant seed potatoes. These experiments, fully reported in the Report for that year, and subsequent tests conducted by the Department under the direction of Dr. Denny showed that vigorous northern and western grown seed can be treated and planted in Bermuda in October and that such seed will, as a rule, yield more heavily than will Long Island-grown seed. During the past four years farmers were instructed on the treatment of seed, and have secured satisfactory results as a rule.

BETTER BULBS.

In 1920 exports of bulbs of the Bermuda Easter lily had shrunk to 749 cases, and in 1928 was up to 7,611 cases, the increase being solely due to the Department's investigations of bulb diseases and methods of control. (Subsequent decline in exports was due to the World-wide business depression.)

The investigation of lily diseases was begun in April, 1920, by Professor H. H. Whetzel, head of the Department of Plant Pathology of the College of Agriculture at Cornell University, N.Y., when on a short visit here as the guest of the Board. On 10th June, 1921, Prof. Whetzel returned to Bermuda, and was attached to the Department for twelve months from that date; and the study of lily diseases begun by him was very vigorously prosecuted by successors. Field inspection was begun in 1925, and gradually the standard of certification was raised, and to-day no field is certified in which are seen off-type plants, or yellow flat plants or more than 5 per cent mosaic plants, and the confidence of buyers of Bermuda bulbs is fully restored.

CONTROL OF PLANT DISEASES AND PESTS GENERALLY.

In 1913 a bulletin was issued in which were given directions for the preparation of Bordeaux mixture for the control, chiefly, of potato blight. In that year and in the years following several agricultural scientists were invited here to advise on disease and pest control and farmers were instructed in the control especially of potato and celery blights and "fireworms." The 1918 bulletin, "Hints on Growing Vegetables", contained brief notes on the uses of the more important agricultural fungicides and insecticides.

As previously noted, Prof. H. H. Whetzel was attached to the Department for twelve months in 1920 and 1921, and in the Annual Reports for those and the following years are enumerated many plant diseases and pests, and means of control which included the modern and more convenient method of application of fungicides and insecticides in the form of dusts.

The temporary appointment of Prof. Whetzel and the valuable work done by him made possible the permanent inclusion of a plant pathologist on the staff, and this has been of very great value to farmers in particular and to the Colony generally. The arduous tasks performed by the pathologist are threefold, namely, (1) the study of local plant diseases and pests and the publication of control methods, (2) the prevention of the introduction of new diseases and pests by examinations and prohibitions, and (3) the examination and certification of plant exports. In respect to (3), it is pointed out that the export of Bermuda Easter Lily bulbs is contingent on certification of freedom from dangerous diseases and pests.

Information on the control of plant diseases and pests was published in the local newspapers, the Annual Reports, the monthly Agricultural Bulletins published regularly since 1921, and in special reports, such as "Guide to the Control of Diseases and Pests of Plants in Bermuda" (1922) by Prof. H. H. Whetzel, "Insects of Bermuda" (1928) by Mr. L. Ogilvie, and "Guide to Spraying and Dusting Operations" (1929) by Dr. H. S. Cunningham.

BETTER FARM LIVE STOCK.

An outbreak of foot-and-mouth disease in 1914 caused the appointment of a veterinarian. The chief duties of the Government Veterinary Officers were the control of contagious animal diseases by (1) requiring adequate certification of freedom from dangerous contagious diseases of animals imported and the examination of all animals at the time of importation, and (2) frequent examination of local domestic live stock and the conditions under which they were housed, as well as slaughter houses and the general conditions under which animal carcasses are prepared and offered for sale. It is pleasing to report that little serious animal disease has occurred since the appointment was made.

In recent years the control of bovine tuberculosis was very effective through the joint activities of the General Board of Health and the Board of Agriculture, the veterinarian of both bodies being the same. In 1933 1,218 dairy animals were tested, representing 87 per cent of the total in the Colony, and but 1.23 per cent were found to be infected.

In 1914 Dr. R. L. Tucker, Government Veterinary Officer, published a bulletin "Hog Cholera in Bermuda", and in 1922 "Common Diseases of Horses, Cattle and Swine." The latter useful bulletin should be in the hands of all local stock owners.

The purchase in 1921 of Montrose, adjoining the Station made possible the keeping of live stock. Chief attention was given to dairy cattle, and from time to time registered Guernseys were imported. The good effects of the wise distribution of the stock bred at the Station are evident throughout the Colony, and it is to be regretted that late in 1934 the Board decided to further reduce the already small herd.

Some well-bred goats were imported, Toggenburgs from the States and Saanens from the West Indies. Berkshire pigs were imported in 1926. In 1925 and 1926 egg-laying contests were held at the Station, and one at Haulbowline Farm in 1928, through the generosity of Mr. L. W. Howarth. In 1933 some poultry was imported and distributed.

MARKETING INFORMATION AND ASSISTANCE.

In 1913 Bermuda farmers were ignorant of the conditions under which their vegetables were marketed; the vagaries of exchange and the seasonal fluctuations of the New York potato market were alike unknown to them. During the last twenty-one years the Department gained considerable knowledge of marketing, and passed it on to all others interested in the sale of Bermuda produce abroad, particularly to farmers. The Department's knowledge of marketing was gained by market surveys, by attendance in the New York and Eastern Canada markets and at marketing conferences, by contact with marketing experts in the United States, Canada, the West Indies and elsewhere, and by other studies of marketing problems.

Since 1913 dock inspection of vegetables was made more rigid, and since 1930 a reform was effected in the inspection of vegetables by the substitution largely of Government packing for inspection at the dock.

Preliminary surveys of the Canadian market, to which attention was given as early as 1922 because of the decline of New York vegetable prices, made it evident that the grading of Bermuda vegetables must be made uniform by central packing. As farmers were unable to do this for themselves, no other course was open for the Department than to take up the task in 1930.

The idea of Government packing was new, too new, indeed, to be quickly accepted, but despite opposition, which remained active in some quarters until the season 1933 was well advanced, the innovation succeeded as the following figures indicate. (As the first Station Packing House was not opened until late in 1930, figures for that year are not given.)

Year	No. crates packed by Department	Percentage of total exports to Canada (exclusive of celery)
1931	13,968	42%
1932	54,613	59%
1933	92,247	80%
1934	103,541	82%

The shipment of vegetables to the favourable market of Canada (free entry as compared with a general tariff of 30 per cent) was made possible by the new refrigerated steamers of the Canadian National Steamships, but the market was entered at a time when all commodity prices were low. Yet central packing, refrigeration in transit and sales through selected brokers secured prices which were above the prices of similar vegetables, if not always equal to the cost of production in Bermuda.

In 1916 after surveys of the New York market (then our principal market), a reduction was recommended in the number of firms to which

Bermuda vegetables were consigned. No action was then taken, but when exports shifted from New York to Canada, the matter was revived. In 1926 shippers of produce were first licensed and bonded, and at a joint meeting of the Board and licensed shippers held on 19th December, 1930, a majority of the latter decided that future shipments of vegetables to the three Canadian ports of Halifax, N.S.; Saint John, N.B., and Montreal, P.Q., should be made to one brokerage firm in each port, and at the same meeting a selection of brokers was made. This arrangement was slightly modified in respect to Montreal in 1932, but the system of sales through selected brokers adopted in 1930, proved itself a sound one.

To return to the packing of export vegetables by the Department. The work proved costly and arduous, as was anticipated. About £3,000 is now vested in three packing houses and equipment, which does not yet include a much needed pre-cooling plant. To encourage farmers to take advantage of central packing, they were not required to bear the full cost of packing: these costs, however, were reduced each year. For the years 1931 to 1934 labour costs per crate were respectively 6.50 pence, 6.08 pence, 5.74 pence, and 4.25 pence.

Major attention was given to export vegetables, but the domestic market was not neglected. Recommendation of suitable varieties of vegetables (already referred to), introduction of new vegetables, particularly sprouting broccoli and Irish Cobbler potatoes, the Annual Agricultural Exhibition, and instruction in the better control of plant diseases and pests aided alike the cultivation of vegetables grown for export and domestic consumption. From the beginning farmers were advised to give attention to the production of produce for consumption on their farms, and printed information on the subject was published from time to time.

In 1923 a curb market was opened at Washington Point in the city of Hamilton, through the courtesy of the Corporation. "The Farmers' Market" was moved from there to other localities, and in 1928 was housed in a suitable building at the foot of Parliament Street. The Market is well patronised, and a large quantity of vegetables is sold in it annually, and—in addition—it exercises a salutary effect on the price of domestic vegetables sold by others.

ASSISTANCE TO ORNAMENTAL GARDENING.

From the beginning the Department endeavoured to encourage horticulture by the Annual Exhibition and the distribution of ornamental plants, particularly to Arbor Societies and other like bodies.

In 1927 "The Flower Garden Calendar" was prepared by members of the Bermuda Garden Club and edited by the Department. This bulletin is an extremely useful publication and contains a wealth of information about the cultivation of annual flowers in Bermuda.

On 16th May, 1928, a horticulturist trained at the Royal Botanic Gardens, Kew, was added to the staff in recognition of the growing local interest in flower-growing and landscape gardening. The Horticulturist has introduced many new plants into the Colony, has greatly increased the Department's distributions, and has in many other ways assisted local gardeners.

THE ANNUAL AGRICULTURAL EXHIBITION.

In 1913 and 1914 the Department held Exhibitions at Rosebank, Pembroke, then followed a hiatus of eight years caused by the Great War. In 1917 and 1918 shows were held as a part of the Department's efforts to encourage the production of food within the Colony.

In 1922 an Agricultural Exhibition was held at the Station and in each succeeding year until 1933. Unluckily for "the Exhibition" and those it benefited, it was not considered to be of high advertising value in relation to the tourist trade, and so was jettisoned in 1934.

The high value of the Exhibition to the community, particularly to children and young people, is well indicated by its steady growth. At the Exhibitions of the Bermuda Agricultural Association held at Rosebank in earlier years, there were made on an average 934 entries of exhibits (for the years 1893—1903), and to the Department's Exhibitions in the years 1922—1933 the annual number of entries were in chronological order: 964, 2,234, 3,433, 3,723, 3,936, 4,208, 4,702, 5,303, 5,971, 6,848, 7,047, 7,320. It is estimated that 7,300 persons attended in 1922 and 16,000 in 1933.

No other local community effort approached the Exhibition, for it affected every class and was supported and enjoyed by all. It stimulated stock breeding, vegetable and flower growing, cooking and craft work. Opportunity is taken to thank for the last time the many public-spirited ladies and gentlemen who helped to make the Exhibition what it was to the people of Bermuda.

BOYS' AND GIRLS' AGRICULTURAL CLUBS.

In the earlier years of the Department agricultural instruction was given to school teachers.

Agricultural Clubs were organised in 1916 as a part of the Department's efforts to stimulate the production of food within the Colony during the War, and their chief activity from 1932 to 1933 was the preparation of exhibits for the Annual Agricultural Exhibition. During the twelve years named the quality of the children's exhibits improved to a most pleasing degree, particularly those of handicraft, and for this reason alone the Exhibition was justified.

Throughout the life of the Clubs many silver cups, cash and other prizes were given by those, Bermudians and visitors, who recognised the value of this work to the youth of the Colony.

ACKNOWLEDGMENT.

In conclusion, I desire to record my conscious obligation during the last fourteen years to an active and loyal staff, and a Board with whom very happy relations have existed.

My grateful thanks are due many friends for their kindly assistance. Very reluctantly I refrain from mentioning some by name, but once begin time would fail me to tell their names; some are in Bermuda, others in the United Kingdom, in the Carribbean, in the United States of America—Maine to California; up in Canada, in the Maritimes, Montreal, Ottawa, Toronto; and some have passed on. In many ways they helped me at tasks which were at times difficult but always of absorbing interest. His Excellency the Governor General James Willcox once told me that I was unusually lucky to have had two jobs which I liked. I agreed with him, and still do.

Respectfully submitted.

E. A. McCALLAN,
Director of Agriculture
1920 — 1934

Hillside, St. Davids,
1st February, 1935.

Report of the Acting Director of Agriculture, 1934.

The Chairman,

The Board of Agriculture.

I have the honour to submit herewith the Director's report for the year 1934. The Director, Mr. E. A. McCallan, was granted leave of absence from 1st August to 31st December, prior to voluntary retirement on the latter date. During this period I acted as Director.

AGRICULTURE IN 1934.

The year under review was most unfavourable to the farmers of the Colony. The decline in prices in the United States resulted in decreased exports to that country; low prices for all vegetables except tomatoes, were obtained in Canada. These poor export values affected the local market. Farmers endeavoured to sell more of their produce at home, causing excessive competition and cheap prices.

Despite the efforts of the Government, farming is still in an unsatisfactory condition. Mechanical grading and packing has, without doubt, assisted the farmer, and partial control of marketing in Canada has prevented undesirable competition. Unless, however, further effective means of assistance are forthcoming the industry will become of very minor economic importance to the Colony.

Exports — Quantities and Countries. Below are given the quantities of vegetables and bulbs exported, and the countries to which they were exported:

Commodity	U.K.	Canada	B.W.I.	U.S.A.	Other Countries	Totals
Beans, bushels	—	106	—	—	—	106
Beets, "	—	1,293	—	50	—	1,343
Cabbage, "	—	8,866	—	—	—	8,866
Carrots, "	4	24,409	4	—	—	24,417
Celery, "	—	15,818	—	—	—	15,818
Cucumbers, "	—	138	—	—	—	138
Kale, "	—	—	—	9,402	—	9,402
Onions, "	—	18,047	647	2	—	18,696
Potatoes "	16	18,135	877	24,486	—	46,514
Parsley, "	—	416	—	61	—	477
Spinach, "	—	330	—	—	—	330
Tomatoes, "	10	17,045	—	—	—	17,055
Misc. "	—	32	—	—	—	32
Totals "	30	104,635	1,528	37,001	—	142,194
Lily bulbs, cases	381	64	—	1,674	190	2,309

The total of vegetables exported is comparable with 153,742 bushels in the preceding year. The total for lily bulbs was 2,014 in 1935.

Exports — Value. The sales and free-on-board values of Agricultural exports were as follows:

Exported to	Sale	F. O. B. Bermuda
Canada	£38,200	£22,600
United States	18,620	9,050
United Kingdom	900	750
British West Indies	330	220
Other Countries	550	380
	£58,600	£33,000

The above totals comparable respectively with £65,060 and £36,525 in 1933.

Based on farm values and expressed in percentages, agricultural exports were divided among the five markets during the last five years as follows:

	1930	1931	1932	1933	1934
Canada	14.8 %	28.1 %	75.0 %	67.8 %	68.5 %
United States	83.8 %	70.2 %	23.0 %	28.5 %	27.4 %
United Kingdom	1.1 %	1.4 %	1.7 %	2.6 %	2.3 %
British West Indies	.06%	.06%	.2 %	.7 %	.6 %
Other countries	.2 %	.2 %	—	.1 %	1.2 %

Agricultural Products, Annual Values. The estimated annual values of local agricultural products consumed locally and exported during the last five years were as follows:

Year	Consumed locally	Exported	Totals
1930	£211,000	£104,000	£315,000
1931	176,500	35,600	212,100
1932	189,255	49,365	238,600
1933	168,500	36,525	205,025
1934	168,500	33,000	201,500

PACKING OF EXPORT VEGETABLES BY DEPARTMENT

Below are given in detail the quantities packed by the Department in the last four years:

	1931	1932	1933	1934
Beans, crates	—	203	395	318
Beets, "	81	926	1,078	1,007
Cabbage, "	173	2,281	5,729	2,014
Carrots, "	3,067	11,881	21,615	19,460
Cucumbers, "	—	183	435	115
Onions, "	744	9,491	16,299	13,333
Potatoes, "	664	4,360	14,368	18,333
Spinach, "	—	430	1,555	330
Tomatoes, "	9,207	24,267	30,956	48,236
Miscellaneous, "	32	591	902	395
Totals.....	13,968	54,613	93,332	103,541

The above figures for 1934 include 4,614 crates shipped to New York.

Southampton Packing House. The following quantities were packed at the Southampton Packing House:

	1932	1933	1934
Beans, crates	—	102	121
Beets, "	153	477	31
Cabbage, "	128	944	156
Carrots, "	2,430	8,360	6,889
Cucumbers, "	—	43	14
Onions, "	—	11,014	8,409
Potatoes "	—	5,413	5,995
Spinach, "	—	171	—
Totals.....	2,711	26,531	21,615

PACKING HOUSE CHARGES AND SUPPLY OF CRATES

The following Packing House charges were fixed by the Board: Beans, cucumbers, onions, parsley, potatoes and spinach — three pence per crate; beets and carrots — four pence per crate; cabbage and tomatoes — five pence per crate. These charges included grading, packing, making and labelling crates, and cartage to dock from Station Packing Houses; the difference in the rates by rail from Southampton (when compared with rates by cart from Station) was collected from the farmers who used the Southampton Packing House.

SALE OF BERMUDA VEGETABLES IN CANADA.

Exports during the Last Five Years. Below are given the quantities exported annually to Canada during the last five years:

	1930	1931	1932	1933	1934
Beans, crates	—	—	233	444	318
Beets, "	388	620	1,396	1,237	1,293
Cabbage, "	687	1,703	3,998	6,448	4,433
Carrots, "	16,841	10,956	17,773	26,005	24,409
Celery, "	8,551	4,453	23,236	9,540	7,909
Cucumbers, "	—	20	313	533	138
Onions, "	10,322	3,360	29,034	20,890	18,047
Potatoes "	452	1,763	7,397	14,459	18,135
Spinach, "	—	20	587	1,618	330
Tomatoes, "	19,748	14,700	30,813	41,557	51,135
Misc. "	122	157	762	928	448
Totals.....	57,106	37,752	115,542	123,659	126,595

Shipments to Each Market. Below are given the shipments (in crates) to each market:

Commodity	Halifax		St. John		Montreal		Vancouver		Totals	
	G.P.	F.P.	G.P.	F.P.	G.P.	F.P.	G.P.	F.P.	G.P.	F.P.
Beans	60	—	109	—	129	—	—	—	218	—
Beets	519	111	435	158	52	17	3	—	1,007	286
Cabbage	1,085	499	831	1,760	98	160	—	—	2,014	2,419
Carrots	4,686	646	6,769	2,280	8,001	2,025	4	—	19,460	4,949
Celery	—	980	—	621	—	6,308	—	—	—	7,909
Cucumbers	12	4	11	16	92	3	—	—	115	23
Onions	3,227	1,006	2,048	1,894	8,058	1,814	—	—	13,333	4,714
Potatoes	1,007	253	1,066	3,927	10,689	256	887	—	13,719	4,416
Spinach	115	1	215	—	—	—	—	—	330	1
Tomatoes	5,234	28	5,857	1,074	37,145	1,797	—	—	48,236	2,899
Misc.	8	—	9	—	10	—	—	—	27	—
Totals.....	16,045	3,543	17,371	11,766	64,611	12,359	896	—	99,923	27,668

Sale Prices. Below are given the average prices at which vegetables were sold in Canada during the last five years:

		1930	1931	1932	1933	1934
Beets,	1-bu. crate	$1.40	$1.42	$1.57	$1.57	$1.31
Cabbage,	2-bu. "	2.25	1.64	2.33	1.73	1.92
Carrots,	1-bu. "	1.39	1.31	1.89	1.43	1.40
Celery,	2-bu. "	2.84	2.98	2.74	1.90	2.40
Cucumbers,	1-bu. "	—	—	2.39	1.91	1.80
Onions,	1-bu. "	1.12	2.04	1.67	1.06	1.31
Potatoes,	1-bu. "	1.97	1.94	1.86	1.75	1.62
Spinach	1-bu. "	—	—	1.55	.86	1.08
Tomatoes,	20lb. lug.	1.19	1.33	1.49	1.61	1.90

Farm Prices. The following prices were obtained by the farmer after payment of all expenses excluding the actual growing of the crop:

		Shillings	Pence
Beans,	per crate.....	1	10
Beets,	" "	1	7½
Cabbage	" "	1	11
Carrots,	" "	2	1½
Celery,	" "	3	1½
Cucumbers,	" "	3	9
Onions,	" "	–	2
Potatoes,	" "	4	–
Spinach,	" "	–	5½
Tomatoes,	" "	4	1½

A marked spread will be noticed, in some instances, between "gross sales price" and "net farm price", which was due to the poor condition of various commodities when received in Canada. For this reason the price netted for onions was negligible, as nearly every shipment had to be repacked before sale. An additional charge of approximately 30 cents per crate was thus incurred for cartage, storage and labour, and the shrinkage during repacking was considerable. Freight and crate costs already had been incurred on the unsaleable portion of these shipments, and it is estimated that the average total loss was about forty cents per crate.

Sale of Vegetables in Canada. I acted in the capacity of Marketing Officer in Canada during the major part of the shipping season; my first visit was from 10th January to 11th February, during which I attended the Canadian Fruit and Vegetable Jobbers' Convention at Quebec City. Subsequent visits were from 27th March to 30th April, and from 5th May to 16th July.

General Observations. The result of the season's marketing in Canada was disappointing both to the grower and to the broker. Although the general wholesale prices of imported produce compared favourably with the previous year, Bermuda vegetables suffered, in some cases, from the poor condition in which they arrived.

Much deterioration was noticed in vegetables between harvesting and their arrival in Canada; weather conditions during the growing season were especially favourable to the spreading of plant disease. Shipments to the Maritimes particularly suffered, as only a limited amount of chillroom space was available on the steamers of the Eastern Service.

It is certain that, had efficient pre-cooling facilities been available in Bermuda, combined with ample cold storage during transit, much of this deterioration could have been checked, and the produce marketed to much better advantage.

COMMENTS ON SHIPMENTS TO CANADA.

Beans. A few crates of beans arrived in good condition, but the majority were practically unsaleable. Only the first pickings of the crop appear to carry satisfactorily, and it is uneconomical to ship any but these.

Beets. Most of the shipments of beets were overgrown. Demand in the Maritimes is small, and many more were shipped than could be economically used. In Montreal, on the contrary, heavier deliveries could have been sold at fair prices. Transplanted beets are not recommended for shipment.

Cabbage. Imported cabbage was available at very cheap prices, varying from $9 to $12 per ton in bulk f.o.b. at the point of production. These low values enabled jobbers to sell at 5 cents per lb. for the greater part of our season. Many of the Bermuda shipments showed considerable deterioration, which resulted in very low prices being obtained.

Carrots. Most of the shipments of carrots had to be repacked before sale, resulting in a loss of from 15 to 50 per cent. Wastage was largely due to attack of the fungus *Sclerotinia sclerotiorum* which was present in all but the later shipments. This fungus is very active when the carrots are held at temperatures higher than 35° F. Since most of the shipments to the Maritimes were carried in ordinary stowage, the wastage in these was considerably greater than in shipments carried in refrigeration direct to Montreal on the Western service steamers.

Celery. Most of the shipments were put in cold storage on arrival in Canada, as considerable variation was found in grade and quality. This variation made it necessary to re-pack and re-mark a large proportion, in order to obtain the best market price. A few growers put up a superior pack to the general average, and whenever possible their consignments were sorted out and sold to the best advantage. The shipments of one farmer-shipper in particular were consistently good; sizes were neatly and plainly marked on the crates, and an accurate descriptive list was forwarded to the broker. This extra attention was rewarded by the increased returns which he obtained.

Part of the shipment of celery and beans by C.N.S. Chomedy to Montreal on 28th April was found to be frozen on arrival. A claim was made, and was later settled by the Steamship Company. The last two shipments to Montreal were very poor, but due to the market being bare they sold at the highest price of the season.

Onions. The condition of the crop was very poor, and it was possible to make only a few sales "ex dock". Most of the shipments to Montreal had to be stored and re-packed owing to the excessive rot which was found on arrival. A certain proportion of the Maritime shipments had to be similarly treated. But for this re-conditioning, it is certain that the entire crop would have sold at prices which would not have covered the marketing charges.

Experimental shipments in bags turned out very satisfactorily, and further work along these lines is recommended. The saving in price, by reason of the cheaper container, was approximately 10 cents per bag; this is a considerable advantage when prices are low.

Potatoes. Shipments were slightly greater than in 1933; quality, in general, was good, with the exception of two or three consigments. Somewhat lower prices were obtained, and the freight concession allowed by the Canadian National Steamships of 5 cents per crate, subject to shipment of 15,000 crates, was of considerable advantage. Nearly one-third of the crop had to be railed from the Maritimes to Montreal before the opening of the Saint Lawrence River to navigation, and the extra rail freight incurred was responsible for a much lower average nett price than would otherwise have been obtained. Cobblers sold at an average of ten to fifteen cents more per crate than Garnets, and had supplies of the former variety been adequate to meet the requirements of the trade, Garnets would have been unsaleable.

Tomatoes. The average returns for the season were satisfactory. Undue competition from foreign sources, immediately before seasonal adjustments in tariff, resulted in the disposal of two large shipments at low

prices. To offset this loss, large deliveries at a later date found a bare market, and consequently sold for a high figure. Farm-packed fruit compared unfavourably with Government-packed, and could never have been sold profitably under ordinary marketing conditions. It is recommended that the use of crate liners be discontinued. Experience has proved that they are detrimental to free ventilation during transit, and that they have no selling value.

ADVERTISING IN CANADA.

During the past three years co-operative advertising has been carried on by the Board of Agriculture and Canadian wholesalers; each contributing to a fund on a percentage basis of the gross sales. This advertising has been directed by the Marketing Officer and the representative brokers with the advisory assistance of the various jobbers and Messrs. Norris-Patterson, Ltd., advertising agents of Toronto. This scheme has brought about a wider distribution. Also it has brought jobbers into closer co-operation, thus reducing the danger of unnecessary price-cutting.

Mr. H. C. Collier, Managing Editor of the Canada-West Indies Magazine, has, as usual, assisted generously towards the advertising of Bermuda vegetables. His keen interest and help at all times have been most valuable and deserve full recognition.

SALE OF VEGETABLES IN U.S.A.

Potatoes and kale were the only vegetables exported to the United States of America. Fair prices were obtained for the early Triumph crop, and growers began to ship heavily. These shipments arrived at a time when larger supplies were coming forward from other available sources. Prices dropped quickly, and some shippers instructed their receivers to hold stocks in anticipation of a rise later in the season. The market did not advance, and a large number of barrels were sold for very low prices, owing to deterioration in storage. Had these shipments been sold on arrival, they would have probably returned more money to the grower.

In contrast to recent years, market prices during the Garnet season were not sufficiently attractive to warrant but very few shipments.

Shipments of kale were equal to last season's; all sales were made on a 'f.o.b. Bermuda' basis. Available supplies were greatly in excess of the quantities shipped, and it is doubtful if the returns for the crop were profitable to the grower.

Prices of other vegetables on this market continued extremely low during the Bermuda season. Had shipments been made under existing tariff conditions, heavy losses would have been made; even without these duties, sales in most instances would barely have covered the marketing expenses.

UNITED KINGDOM MARKET

Recent tariff duties imposed on foreign produce imported into Great Britain have opened up a potential market for Bermuda vegetables. While prices, as elsewhere, are low in this market, the large population centred in London and the north of England annually consumes immense quantities of imported fresh vegetables.

The following duties imposed on vegetables imported from other than British territories are of interest:

Carrots	2s. 4d. per cwt.	all the year.
Potatoes	4s. 8d. " "	November 1st to June 30th.
Tomatoes	2d. per lb.	June 1st to July 31st,
	1d. " "	August 1st to October 31st,
	10 per cent ad valorem	rest of year.

The total imports of potatoes into Great Britain in 1933 were 3,928,000 cwt. (expressed in Bermuda barrels 2,618,000). Imports of tomatoes in the same year, expressed in Bermuda crates, amounted to over 16¼million crates.

During the year the Department made small experimental shipments of carrots, tomatoes and potatoes. One of these shipments, forwarded in April, sold in Liverpool at the following prices:

Garnet potatoes	9/-	per bushel crate
Cobbler "	8/-	" " "
Carrots	6/-	" " "

On the 26th December another shipment was made, also to Liverpool. Prices obtained were:

Triumph potatoes	5/6	per bushel crate
Katahdin (new white variety) potatoes	10/-	" " "

Three shipments of tomatoes which were made did not arrive in saleable condition.

These prices do not compare unfavourably with those obtained elsewhere, and it would appear that a thorough survey of conditions in the United Kingdom is justified, in order to determine the value of this market. One of the immediate difficulties is the lack of direct shipping opportunities which occur only at infrequent and irregular intervals.

LILY BULBS.

Exports of bulbs of the Bermuda Easter lily *(Lilium longiflorum* var. *eximium;* trade name, L. Harrisii) during the last five years were as follows:

1930	5,508 cases
1931	4,270 "
1932	3,009 "
1933	2,014 "
1934	2,309 "

The number of growers and areas under cultivation during the last five years are given below:

Year	Growers	Acres
1930	157	62.7
1931	156	56.2
1932	105	44.0
1933	70	33.0
1934	50	20.2

Copy of the report of the Board's London representative, Messrs. Robert Tucker and Co., will be found in Appendix A.

DOMESTIC MARKET.

No reliable data is available to determine the annual value of agricultural produce sold locally. Previous to the establishment of the Farmers' market in 1923 the distribution of farm produce was largely through grocery stores and commission merchants in Hamilton; some of whom specialised in supplying hotels and boarding houses to the benefit of a great number of farmers.

The opening of the Farmers' Market was a new departure in marketing methods; it enabled a limited number of farmers to sell direct to the consumer, and it provided a cheaper and a more varied supply of fresh vegetables to the general public. While this market serves part of the farming community usefully, it is apparent that a market having a wider field of operation is necessary to solve the distribution problem in its entirety. There is reason to believe that the establishment of a local wholesale produce market under surveillance of a Government body would provide a solution to the local marketing problem; it would absorb the functions of the present Farmers' Market; it would restore the activities of store merchandising and would greatly assist in supplying hotels which now import large quantities from abroad.

Further extension of the local market would be possible if cold storage and canning facilities were available, both would provide means of preserving any surplus. Under present conditions it is probable that the prices obtained for canned produce would not, by themselves, be profitable to the farmer. But veiwed in a broader way, it is certain that it would convert into cash that which is now wasted, and at the same time provide local supplies when these are not available in their fresh form.

HORTICULTURE.

The horticultural work of the Department has been handicapped through lack of adequate facilities. The Horticulturist has done useful work through the Garden Clubs and by assistance to private individuals. The conversion of the greater part of the Agricultural Station into an up-to-date botanical garden should be considered; this would considerably add to the natural attraction of the Colony, and be of considerable interest to many visitors from the North.

INSPECTION OF PRODUCE.

Dock inspection of exported produce has decreased since Government packing facilities have been available to the farmer. The small quantities now shipped in this way have shown considerable improvement, due, no doubt, to the educational effect of central packing and grading. The majority of farmers realise the importance of adapting their grading and packing to meet the continual changes and competition in marketing. It is difficult to regulate shipments on the dock; education on the farm is much more effective, and this is best accomplished by friendly contact between the Department and the growers.

PRE-COOLER AND COLD STORAGE PLANT.

This subject has been under consideration by the Board since 1930. Urgent need for these facilities is fully recognised by all who are interested in Agriculture, but the problem of obtaining funds for the erection and operation of such a plant has yet to be solved.

Various sites have been suggested, but it is obvious that to operate efficiently and economically, the plant must be situated as close as possible to the steamer wharves. To obtain the best results from pre-cooling it is

necessary to move the produce from the chillroom to the ships' chambers quickly, otherwise much of the benefit is lost. This would be impossible if the vegetables had to be carted from any distance; haulage expenses would also add to the operating costs.

A site belonging to the Corporation of Hamilton has been surveyed and appears to be an ideal situation. It runs eastwards to the pumping station from the bridge which connects No. 6 Shed with Front Street, and takes in the present Farmers' Market and other buildings belonging to the Corporation. These could be cheaply converted to form part of the proposed chillroom, as the exterior walls, which are built on solid foundations, need not be disturbed. The structure is 90 feet long by 30 feet wide, and covers an area of 2,700 square feet. This would provide approximately 30,000 cubic feet of refrigerated space. A lean-to shed to the eastward of the main building could be used for housing the machinery and also as a receiving shed for produce.

If necessary, a new building could be erected to the east of the existing Farmers' Market to provide a clearing house for local produce and for the accommodation of canning machinery.

AGRICULTURAL STATION.

Vegetable Seed Tests. During the year 205 samples of seed were tested for viability, and germinative results were generally satisfactory. Many farmers imported their own seed on the advice of the Department, and good results were obtained.

Vegetable Field Tests. These tests were considerably reduced compared with previous years.

Carrots. Further progress was made in growing stecklings for seed-producing purposes. Roots were selected in February and sent for propagation to the Central Experimental Farm, Ottawa. The seed of eight of the stecklings was returned to Bermuda in November. Seven of these seed selections germinated satisfactorily, and it is hoped that suitable stock will be available next year for further experiment.

Tomatoes. The autumn and winter tests were conducted under favourable weather conditions, and results were satisfactory. The seed was sown on 7th August, 1933, and the seedlings transplanted in the test plot on 14th September an area of 45 rods situated on the east side of the North Field being used. This plot had been cropped during the summer with soy beans, which had been Rototilled under in August, and a further liberal dressing of farmyard manure was applied in September. The vines were planted in double rows, 3 ft. between rows and 22 in. between vines in each row. Later the plants were trained to ¼ in. iron rods 6 ft. long. These were grouped in units of four, brought together at the top and tied. Two applications of castor pomace, each of 500 lbs. to the acre, were given during the growing season.

The following varieties were tested: Bonny Best, Break O'Day, John Baer, Pritchard, Greater Baltimore, Marglobe, Red Head, Red Bird, Success, Earliest-of-All, Cooper's Special, Florida Special, Brimmer, Pepper, Danier, Venturia, and Superb Salad.

The total yield was 9,503 lbs. or an average of 211 lbs. per rod.

Pritchard gave the highest yield, with 216 lbs. per plot. Break O'Day with 204 lbs. per plot and Bonny Best with 193 lbs. per plot were next in order. John Baer yielded well. The other varieties were not as suitable for export nor did they yield as heavily.

Potato Experiment 1933-1934. Fall planting, conducted in two Eastern plots, South field.

The test consisted of Bliss Triumphs of the following origins:

(1) Long Island grown, from Nebraska, State certified seed. Planted 3rd and 4th October, 1933.

(2) Nebraska grown, from Experiment Station, North Platte, Neb. Planted 4th Oct., 1933.

(3) Nova Scotia. Planted 13th October, 1933.

(4) Louisiana grown, from Experiment Station, Louisiana State University. Planted 13th October, 1933.

The Long Island seed was grown by six farmers on Long Island; seed stock in each instance being obtained from the Nebraska State Certified Seed Potato Growers' Association. The Director of Agriculture (Mr. E. A. McCallan), assisted by Dr. S. E. A. McCallan of the Boyce Thompson Institute for Plant Research, Inc., Yonkers, New York, inspected the plantings on Long Island on 20th and 21st June, 1933. The Director in his report recorded the comparative absence of virus diseases in all the fields, but stated that contamination might result from volunteer leaf-roll plants in the fields of four growers, which had been planted to potatoes the previous year.

Readings of the plantings at the Agricultural Station confirmed the Director's fears, for infestations of leaf-roll varying from 13 to 55 per cent were traced to the seed of these growers. The considerable variation in these readings suggested that in some cases roguing of volunteer leaf-roll plants had been effected. This was further borne out in yields, as when infestations averaged 55 per cent the yield averaged only 56 lbs. per rod, while those averaging 13 per cent leaf-roll averaged 80 lbs. per rod. The yield of the seed from the fields which had not grown potatoes the previous year was 96 lbs. per rod.

The Nebraska seed behaved in a most unusual way. The tubers were well sprouted when planted, and a proportion were dipped in a 1½ per cent solution of ethylene chlorhydrin. Despite these satisfactory conditions the seed made no growth after planting, and the experiment was abandoned.

The Canadian seed was quite dormant when planted on 13th October, two weeks ater its arival in Bermuda. Treatment with a 3 per cent solution of ethylene chlorhydrin was given prior to planting. A small quantity was kept untreated for check purposes; of these only an occasional plant had appeared above ground on the 28th day from planting, while the treated tubers showed an emergence of 40 per cent on the 19th day and 97 per cent on the 28th day. Although responding so readily to the treatment, they did not grow as quickly as seed from other sources which had been through a proper rest period. Leaf-roll was less than 1 per cent in this Nova Scotian seed, and production was 148 lbs. per rod of ground.

Seed from Louisiana was tried in 1933 for the first time with good results. Grown from Nebraska stock, the seed was grown under Louisiana state regulations, and harvested in May. Having thus had a full resting period before arrival, it germinated promptly and uniformly; the emergence rate being 100 per cent on the 10th day. Growth was rapid, and there was no leaf-roll. Part was dug at 86 days, and the major portion at 100 days, when they were still fairly green.

Summary of Field Reading:

Origin.	Vigor.	Misses.	Leaf-roll.	Mosaic.	Yield. per rod.
Long Island from fields not planted to potatoes the previous year	95%	13%	2.3%	Seen	96 lbs.
Long Island from fields planted to potatoes the previous year (volunteer leaf-roll plants probably rogued early)	90%	14%	12.8%	Seen	80 lbs.
Long Island from fields planted to potatoes the previous year (volunteer leaf-roll plants probably not rogued until late, or not at all)	90%	10%	55%	Nil	56 lbs.
Nebraska	Experiment abandoned.				
Nova Scotia (treated)	97%	3%	.8%	Nil	148 lbs.
Louisiana	100%	Nil	Nil	Seen	156 lbs.

Winter and Spring Planting. A comparative test was conducted in North field, planted 17th January. The plantings consisted of samples of certified Chili Garnets, Irish Cobblers and Green Mountains, from Nova Scotia, and certified Katahdins from Maryland, U. S. A.

Field Readings and Yield:

Variety.	Vigor.	Leaf-roll.	Mosaic.	Yield per rod.
Chili Garnet	90%	2.6%	Seen	52 lbs.
Irish Cobbler	98%	Seen	Nil	61 "
Green Mountain	92%	Nil	17	53 "
Katahdin	100%	Nil	Nil	70 "

Conditions were unfavourable during the latter part of the growing period; a slight infestation of Phytophthora blight appeared, and was kept under control. Twelve bushels of Katahdins were placed in cold storage after digging in April, and when taken out in September were found to be in perfect condition.

Live Stock. The number of live stock at the Station was reduced at the end of the year.

Pure-bred cattle were imported by the Department at a time when dairy stock found in the Islands was of poor quality. Breeding was commenced, and this activity co-incided with the growing importance of the tourist industry, and a consequent larger demand for fresh milk. These prosperous times encouraged local dairymen to take every opportunity of the stock facilities given at the Station to improve their herds, and to-day some very fine herds of Guernseys are to be found. In view of the high standards which have been reached, and the necessity to curtail expenditure, the Board decided that the Department might curtail its activities in this direction for the present.

SEED POTATOES.

Long Island Triumphs.

The majority of the seed imported was satisfactorily free from virus. Yields on the whole were small, due largely to unfavourable weather conditions. Some of the importations were badly graded and con-

tained an excessive amount of very small tubers, and complaints were received from one source of tubers rotting after arrival, which was found to be due to *Fusarium*. About 160 barrels imported from one source contained an excessive amount of virus. Samples from this source planted at the Station contained from 15 to 75 per cent leaf-roll. Nine barrels from the same source planted on one farm gave similar results and the yield in this instance was only two and a half barrels. This is difficult to understand since these potatoes were grown on Long Island in a field that was not planted to potatoes the previous year, and which on inspection by the Director in June was found free from virus. The progeny of one barrel of Katahdin, grown in the same field, when planted at the Station, were free from virus.

Canadian Triumphs.

On the whole seed from this source gave satisfactory results. Since the majority of this seed was planted later than the Long Island stock it escaped some of the early unfavourable weather conditions, and yields as high as 180 bushels per acre were reported by some farmers.

The maximum leaf-roll observed on the farms was 3 per cent, but the majority of plantings contained less; some fields were free. Mosaic was more prevalent, especially in the late plantings. The highest observed in the earlier plantings was 7 per cent, but late plantings from the same source revealed as high as 30 per cent. Apparently the disease was masked in the earlier plants, and the cold weather later on intensified the symptoms. It would appear that mosaic may be satisfactorily controlled by confining importations from fields that are free, or contain less than one-half per cent on first field inspection by the Canadian Government Certified Seed Inspection Service. Sufficient certified plantings are available in Nova Scotia to make this selection possible.

Louisiana Triumphs.

Samples were received from the Louisiana State University, Baton Rouge. These were planted on a farm under the supervision of the Department. They were free from virus, but did not crop satisfactorily on account of unfavourable weather conditions.

Conclusions.

In view of the uncertainty of virus in seed of Long Island origin, and the fact that earliness of the crop is not such an important marketing factor as formerly, it would appear that better results may be obtained by confining importation of Triumph seed largely to Canadian certified stock.

STAFF.

Mr. E. A. McCallan, Director of Agriculture, was absent from the Colony from 10th to 20th June inspecting seed potato fields on Long Island, N. Y. He was granted leave of absence from 1st August to 31st December prior to voluntary retirement.

Mr. T. A. Russell, Plant Pathologist, was absent on sick leave from 27th July to 20th August. He acted as Director from 10th to 20th June.

Mr. W. R. Evans, Agricultural Assistant, acted as Marketing Officer in Canada from 10th January to 11th February, during which time he attended the Canadian Fruit and Vegetable Jobbers' Convention at Quebec City. He was again absent in Canada from 27th March to 30th April, and from 15th May to 16th July. From 1st August to 31st December Mr. Evans acted as Director.

Mr. J. C. Nauen, Horticulturist, was on vacation leave in England from 5th May to 5th August.

Mr. T. Arthur Hollis, Inspector of Produce, was on sick leave from 16th to 30th July. He was absent on vacation leave from 3rd to 24th September.

Dr. C. J. Cooper, Government Veterinary Officer, was absent on leave from 8th to 25th August in the United States of America, during which time he attended the International Veterinary Congress as an official delegate from Bermuda.

FINANCIAL.

The expenditure of £11,220. 0. 0 was authorised by the Appropriation Act of 1933 and Resolves 8, 17, 18 and 24 of 1934. The sum of £10,759. 2. 11. was expended, a balance of £460. 17. 1. remained in the Treasury, and the sum of £2,409. 6. 9. was reimbursed to the Treasury; the nett expenditure of the Department was, therefore, £8,349. 15. 2. These amounts are exclusive of salaries.

During the last ten years the expenditure of the Department and receipts for sale of vegetables, etc., and in late years receipts from Government Packing Houses, were as follows:

Year.	Gross Expenditure.	Receipts.	Nett Expenditure
1925	£ 4,851 16 7	£ 129 18 9	£4,721 17 10
1926	5,169 5 5	207 8 9	4,961 17 8
1927	4,560 15 5	346 2 4	4,214 13 1
1928	4,175 5 11	157 10 8	4,017 15 3
1929	4,348 6 10	195 0 1	4,155 6 9
1930	6,952 14 3	247 18 9	6,704 15 5
1931	7,418 3 3	280 1 1	7,138 2 2
1932	7,276 7 4	466 7 1	6,810 0 3
1933	10,985 7 0	2,434 9 7	8,550 17 5
1934	10,759 2 11	2,409 6 9	8,349 15 2

APPRECIATION.

It is unusual to refer to individual members of the Department in this report, but exception may be permitted on the retirement of Mr. E. A. McCallan.

Mr. McCallan retired on 31st December, after thirty-two years' work in the Civil Service. His career in the Department of Agriculture, first as Agricultural Assistant and later as Director, marked him as an administrator of unusual ability. His retirement is regretted by all members of the staff, and it is hoped that he may be spared many years to enjoy his well-earned rest from active service.

I wish to record my appreciation to many friends in Canada who rendered invaluable assistance in connection with marketing. Special mention is due to the representative brokers, whose co-operation I received at all times.

Respectfully submitted,

W. R. EVANS,
Agricultural Assistant
Acting Director from 1st August to 31st December.

Agricultural Station,
Paget East,
15th March, 1935.

Report of the Plant Pathologist, 1934.

The Chairman,
The Board of Agriculture.

I have the honour to submit my report on the work done and on the diseases and pests occurring during the year 1934.

GENERAL REVIEW.

The year under review was notable for no new diseases or pests of a serious kind, although certain of the usual troubles were unusually destructive. There was an exceptionally severe epidemic of Phytophthora blight on the potato crops in the early months, the greatest damage being suffered by the Irish Cobblers which showed much tuber-rot owing to the fact that the fungal spores from the blighted foliage were washed into the soil by heavy rainfall shortly before the time of digging. Much depreciation and loss in shipments of carrots occurred during transit to Canada through attack by *Sclerotinia sclerotiorum*, and it appears that this trouble is bound to continue until means can be found to reduce the period elapsing between reaping and arrival in cold storage. In many of the lily fields there was loss from the virus disease rosette or yellow flat.

Amongst the major pests, the thrips *T. tabaci* infesting the onion crop, accounted for heavy loss. The potato tuber moth *Phthorimaea operculella* caused trouble in an experimental shipment of potatoes sent to British Columbia in February, and traces of its attack seen in two small lots of potatoes in April and May necessitated their fumigation with carbon bisulphide before shipment to Eastern Canada; but apart from these occurrences this pest was much less in evidence in potatoes than during the previous year, though still a common cause of rejection of tomato fruits. The palmetto scale, *Comstockiella sabalis*, continued its spread into new areas, though there was some indication of its control by parasites in areas where it has been present for some time; and evidence was obtained that the Mediterranean fruit-fly also is parasitised to some extent, although not sufficiently to prevent its remaining a source of annoyance.

It is probable that few growers realise the cost to them of diseases and pests, not only the more obvious tolls charged by such epidemics of disease and by such major pests as have been mentioned, but also the insidious and endless taxes imposed by minor diseases and pests on nearly every crop. Cabbages for instance are not regarded by the average grower as suffering unduly from pests, and yet, in a count made in a field during April, over half of the heads were found to be attacked by caterpillar (including both fireworm and cutworm) while more than a quarter were so badly injured as to be worthless for selling; and most cabbage fields will tell a similar story.

Such wastage may safely be neglected if prices gained by the crops are good, but it becomes of vital importance in times like the present when poor prices are the rule. The situation therefore does not provide, as many people appear to think, an excuse for reducing effort and expenditure on agricultural research, but on the contrary it presents a real challenge to us to intensify our efforts and to increase our skill in crop production, and, above all, to improve our understanding of those diseases and pests whose ravages lead to such continuous and heavy loss.

Most of the time available for research work during the year was devoted to a study of the palmetto scale, but as the position with regard to this pest becomes clearer it is hoped to give much greater attention to

pathological problems affecting crop-plants. Such problems as the sources of blight infection of celery, the control of the fungus Sclerotinia causing decay of carrots and other vegetables in storage, and the transmission of the mosaic diseases of lilies, press for attention, since their solution would be of immense value to Bermudian agriculture.

OFFICE AND ADVISORY WORK.

The usual office work was done, including correspondence on plant pathological matters, the preparing of articles monthly for the Bulletin and occasionally for the press, and the writing of monthly and special reports. The laboratory equipment was maintained in good order, and the pathological library was kept up to date, publications received being reviewed and an index made of all papers considered to be of relevance to Bermudian conditions.

Records were kept of the occurrence of diseases and pests in the field, and recommendations were made to growers for their control. Advice was given to gardeners on pathological troubles of flowering plants and fruit-trees. The crops grown on the experimental plots, and the ornamental plants at the Station were supervised with respect to diseases and pests.

MAJOR PROBLEMS INVESTIGATED.

Palmetto Scale. The area of attack on palmettos by the scale *Comstockiella sabalis* increased during the year, greatest advance being noticed in the parishes of Smiths and Devonshire. Late in December it was found in Somerset, a clump of old palmettos near the Naval Recreation Ground being very heavily infested, while young palmettos at some distance showed slight attack. As this outbreak is situated at a distance of some miles from any other known case of attack, an attempt is being made to eradicate this outbreak with the assistance kindly given by members of the Garden Club of Sandys Parish.

As the year advanced, the failure of the standard spraying with oil emulsion to control the scale became increasingly evident, and in October spraying was suspended. While it may give some measure of control where the tree is slightly attacked, spraying has seldom proved to give lasting relief in cases of heavy infestation.

A survey of scale outbreaks in different areas, the results of which were described in a previous report, showed that while the scale was attacked by several parasites, two of these, *Physcus sp.* and *Encarsia portoricensis,* occurred only in the St. Georges district. As scale attack in that area was much less severe than elsewhere, it was thought that these two species might be responsible for the satisfactory condition and accordingly it was decided to introduce them into other areas. Early in January, portions of leaves bearing parasitised scale and adult parasites were transferred to palmettos heavily infested by scale at the south-east corner of Paget Marsh. Both parasites became established and soon spread to neighbouring palmettos that were affected, and by the end of the year the two species were to be obtained in quantity at a distance of some fifty yards from the point of their introduction, and the condition of the palmettos in that corner of the marsh was greatly improved. During the last three months of the year these parasites were further distributed in other areas where scale attack occurred.

A start was made in the study of the life-history of the scale insect. The hatching of the egg and emergence of the larva was observed, and an attempt was made to discover the duration of the motile stage which followed. The newly-emerged larva is extremely active on its legs and this period of motility may last for more than a day, though in no case noted

did it exceed two days. The insect then settled down and proceeded to construct a white fibrous covering or shell over itself, the stages in this process being followed under the microscope.

Attempts to establish colonies of the scale on palmetto leaves in the laboratory, by transference of larvae in the active state, gave poor results owing to very high mortality of the larvae, suggesting that some essential condition found in nature was not here reproduced. The larvae showed a tendency to collect in narrow and sheltered places, such as folds of the leaf.

Mediterranean Fruit-fly. Records were kept throughout the year on the occurrence of the fruit-fly in order to discover its abundance and the favoured host-fruits at different seasons, and to find if it was attacked by any parasite. For this purpose, infested fruits were collected from various sources, placed on soil in jars in the laboratory, and kept under observation for some weeks.

The fly was not seen early in the year but on the 16th March several specimens were seen stinging lemons and on the same day larvae were found in loquats. Thereafter it became increasingly common and in July it was collected in a wide range of fruits, peaches, oranges, sapodillas, papaws, peppers, and others of less importance. Later it became less abundant, but up to the end of the year it was to be found in citrus fruits. Such fruits as papaws, sapodillas, and guavas were only attacked when ripe or over-ripe, and as a rule citrus fruits also escaped trouble when picked before they were fully ripe.

From a sample of infested peaches collected in the Station Orchard on 20th June, 4 specimens of *Opius humilis*, three females and a male, were obtained about fifteen days later. Supplies of this parasite were introduced from the Hawaiian Islands and liberated in various localities between February 1926 and January 1928, but, nothing having been seen of it since then, the introduction was assumed to have been a failure. Its re-discovery after more than six years shows that it has in reality become established in Bermuda. An attempt was made to breed a quantity of this insect by placing the four specimens in a jar along with infested fruit, but, although a second generation was obtained, these proved to be mostly male, and died without progeny. Two more specimens were later obtained from small yellow guavas attacked by fruit-fly and one from sweet peppers, all collected in Paget Parish. It remains to be discovered whether Opius is distributed throughout the Colony, and whether or not it exercises any significant control over the pest.

Two tins of a poison bait, consisting of 8 oz. bran, 8 oz. borax and a trace of sodium arsenite to 1 gal. water, were hung on a peach tree in the Station orchard, but although 96 female flies and 44 males were caught, the peach fruit was nevertheless destroyed. Greater success was obtained by enclosing the fruit in paper bags.

Diseases and Pests of Tomatoes. As in the past two years, attention was given to the causes of loss in the tomato crop, and a fair idea of the chief pests and diseases has now been gained. Two troubles appeared this year which had not formerly been noticed. One of these was a fruit-rot first seen during January, causing severe attack in tomatoes in a garden. The first sign of infection was a brown indentation resembling a bruise on the green fruit usually near the stem-end, and this spread and darkened till the whole fruit turned brown and wrinkled. A species of Phytophthora resembling *P. infestans* in appearance was found sporulating on diseased fruits, but the culture was lost before the species could be accurately determined. However when diseased tissue of tomato was placed on a wounded

potato kept under damp conditions, a rot resembling the tuber-rot caused by *P. infestans* was produced, and on the other hand when tissue from a potato rotted by *P. infestans* was placed on a tomato fruit, a rot was produced similar to that seen occurring naturally, and in the circumstances it seems safe to refer to the fungus on the tomato as *P. infestans*. It is of interest to note that in the case investigated the foliage showed none of the blighting caused by this fungus on potato plants. A number of tomatoes showing the same Phytophthora rot were picked out of a box of rejects at the Packing-house in February, so that it appears that this disease may be not uncommon in wet weather during the winter months.

In a varietal trial of tomatoes at the Station during October an unusual trouble was seen confined to the variety Best of All. Several plants were noticed scattered about the plot which remained dwarfed, with leaves undeveloped and deformed, vaguely resembling stags' horns in outline, and of a yellow colour and rather oily appearance. Closer examination showed the presence of myriads of a very small mite which has not yet been identified. Some of the affected plants were given a heavy application of sulphur dust and these showed complete recovery in a short time, while the plants left untreated remained dwarfed and produced no fruit of any size.

Work was continued on the injury previously referred to as "scab-spot", consisting of very small superficial corky spots on the fruit, a type of damage which was unusually common at the start of the main crop in May. The symptoms resemble those of the disease Bacterial Speck which has recently been described from Florida, but no pathogenic bacteria have so far been isolated from diseased fruit in Bermuda. As the spots sometimes occur in definite lines, it was thought that they might be caused by the feeding of some insect, such as a type of bug, and a record was therefore kept of insects found on tomato plants, and certain species thought to be capable of causing damage to the fruit were caught, and placed either in a muslin cage, enclosing a truss of young fruits, or else in a glass tube of which one end was closed with muslin and the other rested against a young fruit. Insects tested in this way included the bug *Nezara viridula*, a small black bug which has yet to be determined, *Lygus pratensis*, the white-fly *Asterochiton vaporariorum*, the leafhopper *Empoasca fabae*, and the Chrysomelid *Epitrix parvula*. While all these were collected on tomato foliage or fruit, only the first two survived any time when placed on fruit alone, and the other four probably did not feed. Nymphs of Nezara placed on green tomatoes, started feeding at once, and were reared to maturity on the fruit alone without difficulty. As a result of heavy feeding the fruit became covered with minute dents and punctures, the tissue below being occupied apparently by air-spaces and failing to colour up with the rest of the fruit, which assumed a blotched appearance on ripening. This bug was found commonly in tomato fields and a small number of fruits were rejected at the Packing-houses on account of Nezara injury. The small black bug not yet identified occurred very commonly in the fields causing a stippling of the leaves, while on the fruit slight injury of a similar type was produced. In no instance was the black scabbing typical of scab-spot seen under experimental conditions.

Work on Lilies. While it is commonly held that bulbs of the Bermuda lily will not tolerate cool storage for any length of time, this belief is, so far as our records go, unsupported by scientific evidence. To obtain some data on this point, it was arranged to place a case of bulbs in storage at 36° F. and to remove and plant up a batch of bulbs at monthly intervals, keeping records of their subsequent behaviour. A similar experiment was

kindly undertaken by the Dominion Botanist at Ottawa, the bulbs in this instance being planted under greenhouse conditions on removal from storage: and observations on their toleration of cool storage are being made also at the Royal Botanic Gardens, Kew, through the kindness of the Director.

Work was started on the disease known locally as "twist", characterised by extreme mottling and twisting of the leaves, a trouble which is generally found scattered throughout the lily fields to a small extent but which in a few fields has been found in quantity, causing heavy loss. This disease has been assumed to be a severe type of mosaic, but the problem is complicated by the fact that bulbs from badly affected plants may give rise the following season to plants which are to all appearances free from disease.

The cause of the chlorosis disease commonly seen in patches in the fields remains unsolved. In order to test if it was due to a deficiency of magnesium, a fertiliser containing this mineral as impurity was applied to the soil around chlorotic plants; but no significant improvement in their condition was caused. An attempt was made to induce the chlorotic symptoms by growing bulbs in pots of sand to which various nutrient salts were added either in solid form or in solution, but only faint chlorosis was produced.

Crosses were made between the Bermuda lily, *L. longiflorum* var. *eximium*, and a Japanese type, var. *takesima* in the hope of obtaining a seedling of improved form in certain characters. Bulbs and seeds of a few different species of lilies were kindly supplied by the Royal Botanic Gardens, Kew, for testing under Bermudian conditions, and two or three of them gave promising results.

Work on Sclerotinia sclerotiorum. The importance of the apothecial stage in the infection of various kinds of vegetables by this fungus becomes increasingly evident, and accordingly an attempt was made to define the conditions under which the sclerotia give rise to perfect fruit-bodies. From sclerotia which were kept over the summer on damp soil in the greenhouse, apothecia were obtained on 22nd November, and from others left in a tin of soil exposed to the weather, the fruit-bodies were noticed six or seven weeks later. While no apothecia were found out-of-doors before January, it seems likely that some were produced during December since Sclerotinia rot of tomato vines was seen in a field early in January.

Antirrhinum Rust. Observations were made during the summer months on the rust disease of snapdragons with the view of discovering the mode of persistence of this fungus from one season to the next. In July, as the shade temperature approached 80° F., the uredospores taken from affected plants failed to germinate, and at the same time rusted leaves or portions of the leaves containing the fungus withered, the uredosori becoming replaced by the black teleutosori. During August these disappeared, most of the withered leaves falling off and many of the shoots dying back, leaving no obvious sign of the rust. A few leaves, however, of which only a small area had withered, remained on the plants, and it was noticed that the green tissue surrounding the dead areas was pale and slightly swollen. Sections of this tissue examined under the microscope showed the presence of living fungal hyphae which were thought in all probability to be those of the rust fungus. Unfortunately most of the experimental plants succumbed during the summer, so that it was not possible to discover if uredosori would appear with the coming of cooler weather in the neighbourhood of the hyphae.

The failure of the uredospores of this rust to germinate at temperatures above 75° F. has been remarked on by other workers, as well as the inability of these spores to live more than eight weeks apart from a living host-plant. Since the mean daily temperature is above 75° F. from June to September, it seems unlikely that the uredospores can play any part in maintaining the fungus over these months; and as the teleutospores have not been found to lead to infection of snapdragon plants, it is difficult to see how the rust can persist unless as vegetative mycelium in such antirrhinum plants as manage to survive the summer.

Insecticide Trial on Cabbages. A test was made of some non-arsenical insecticides against caterpillars on cabbages, with the object of finding a substitute effective under Bermudian conditions for arsenates, the use of which cannot be advocated on this crop. Materials tried were a derris spray (Katakilla), a derris dust (Drymac No. 2), and barium fluosilicate (Dutox) mixed with two parts of flour and applied as a dust. The cabbages were planted in five beds of four rows, and each treatment was used in one row in each bed, the fourth row being left untreated. A random arrangement was utilised for the treatments in each bed. The first application of insecticide was made when heads were beginning to form, a second was made a fortnight later, and after another fortnight; just before cutting, a count was made of all heads showing caterpillar injury. Most of the damage was caused by the larvae of *Phytometra brassicae*, but other Noctuids were not uncommon.

The summarised results showed that 57 per cent of the heads in the untreated rows were damaged, the corresponding figures for derris dust and spray being 33 per cent and for barium fluosilicate only 16 per cent. Derris proved effective at the time of application, but had little residual action, and would doubtless give better results if applied more often and at shorter intervals. The barium salt had an effective and lasting action, but according to information obtained since this test was made, it appears to be regarded by some food authorities as little less dangerous than arsenicals when applied to vegetables in the field.

INSPECTION SERVICES.

Lily Inspection. The first inspection of lily fields was made between the 10th and 31st January, the second between 16th March and 7th April, and those fields which failed to pass the latter inspection were visited a third time between 18th April and 23rd May.

The fields certified as being up to the required standards with respect to disease numbered 77 with a total area of 3,241 sq. rods, the number of growers being 50. This area was only 67 per cent of the corresponding area in 1933. Four fields were condemned on account of the yellow flat disease, which was found present at the time of the final inspection.

Inspection of Plant Importations. Consignments of plants and bulbs inspected by me at the Post Office and docks numbered 257, the largest consignments consisting of strawberry plants from the United States and young celery plants from Canada.

Pests most commonly found were scale insects and mealy bugs occurring on plants from the West Indies, the Bahamas, and the United States of America, and in most cases such plants were fumigated. Some bundles of chives plants imported from the United States were found to be infested with dipterous larvae, burrowing at the base of the shoots and in the heart of the plant. Some of the larvae were kept in captivity and reared to maturity, and the fly which emerged was identified as the black onion fly, *Tritoxa flexa*, a pest of the onion crop in the Nothern and Middle

States, attacking plants in the field as well as onions in storage. The infested plants and all specimens of the fly reared from them were destroyed. Bulbs of Narcissus and Lilium and plants of citrus imported contrary to regulation were confiscated and destroyed.

Imported vegetables, and in particular heads of lettuce and cabbage, frequently carry pests, and, while their importation is permitted without restriction, a wide loophole exists in our plant quarantine system.

Inspection of Seed. Examination of two supplies of celery seed imported from Messrs. Clause, France, showed the occurrence of slight infection by blight, affecting 0.5 per cent of the seeds. A later supply, however, showed considerably more, 2.5 per cent of the seeds being counted as bearing pycnidia of the fungus.

SPRAYING SERVICE.

The two motor-sprayers were kept in working-order, frequent repairs being necessary on account of their worn condition. As usual they were hired out to farmers by the day or the half-day, and were in great demand at certain seasons of the year. They were employed in all during 135 days as against 77 days in the previous year.

At the Station it was found more convenient as a rule to apply dusts rather than sprays. A stock of oil emulsion was made up when necessary and was supplied for the control of scale insects.

DISEASES AND PESTS OBSERVED DURING THE YEAR.

VEGETABLES.

Beans. Mildew, *Erysiphe polygoni*, was the most common disease of string beans, *Phaseolus vulgaris*. During April, a small plot was severely attacked by bacterial blight *(Bacterium phaseoli)*, a disease which, though reported in 1921, has not been recorded since. Slight damage caused by rust, identified as *Uromyces appendiculatus*, was found in a field in June.

Beets. The fireworm, *Hymenia fascialis*, was destructive in the autumn months.

Cabbage and Kale. Cabbages suffered as usual from the attack of caterpillars, particularly those of the looper, *Phytometra brassicae*. The kale and other crucifers grown during the autumn months remained unusually free from black-rot *(Bacterium campestre)*.

Carrots. Loss caused by the fungus *Sclerotinia sclerotiorum* during shipment has already been mentioned. In May, carrots at the Agricultural Station were badly attacked by blight *(Macrosporium carotae)*, which is recorded from Long Island and Massachusetts as causing loss during exceptionally rainy summers.

Celery. Septoria blight caused some trouble towards the end of the season, but was much less destructive than in the two previous years.

Cucurbits. A severe attack of *Aphis gossypii* on cucumbers under glass in January was checked by the use of nicotine. Much loss was caused in pumpkins, melons, and squashes by melon-borers, of which the two species seemed to be concerned, *Diaphania hyalinata* and *D. nitidalis*.

Onions. Damage by thrips, *T. tabaci*, was very heavy on the onion crop.

Peppers. Sweet peppers suffered from fruit-fly attack and to slight extent from the leaf-spot caused by *Cercospora capsici*.

Potatoes. The Bliss Triumph potatoes dug in January suffered much injury from blackeye *(Phytophthora infestans)* and still greater loss was caused to the Irish Cobblers dug at the end of April. A load of potatoes grown in wet pondland and brought to the Packing-house in December contained a number of tubers affected by a wet evil-smelling rot starting at the stem-end, and this trouble was diagnosed as black-rot caused by *Bacillus phytophthorus.* Triumph seed imported in September from one source in Long Island showed as much as 25 per cent affected by a stem-end rot due to a species of *Fusarium* at the time of planting. The Irish Cobbler and most of the Garnet crop were satisfactorily free from virus disease, but Garnets from one seed-grower were of inferior quality, showing 30 per cent virus infection. In some of the Triumph potatoes grown from Nova Scotian seed, counts of 30 per cent mosaic were made during December.

On the Station grounds, Triumphs were badly attacked during dry weather in October and November by cutworms which bit through the stalks at ground level. Two species were involved, of which one was much more abundant than the other, and, the moth being reared to maturity, it was identified as a species of *Feltia.* Hopperburn caused by *Empoasca fabae* was later seen in the same field, and elsewhere some injury was done by leaf-folders, the larvae of *Psara periusalis.*

Soybeans. Bacteria were found associated with a leaf-spot of soybeans seen on the Station grounds, but as the damage was of little consequence no attempt was made to identify the organism.

Tomatoes. Tomatoes grown in January suffered badly from the fruit-rot caused by *Phoma destructiva,* but this trouble disappeared with warmer weather though this fungus was found in one instance in June causing a leaf-spot. Fusarium wilt was noticed in a few fields during September and October. As a result of drought in October, a promising crop of tomatoes at the Station was ruined by Blossom-end Rot, an occurrence of unprecedented severity so far as our records go. The leaf-mould, *Cladosporium fulvum,* occurred on the foliage of the same crop.

Larvae of *Phthorimaea operculella* were not uncommon in the fruit towards the end of June. One grower complained of its occurrence in fruit in his field during May, and when this was investigated, a number of old potatoes riddled by the pest were found scattered about the field between the rows of tomatoes. The small black bug previously mentioned in connection with fruit injuries was abundant on the foliage of tomatoes during the summer, as well as on string beans, sweet potatoes, cucurbits, and many other plants, a severe stippling being caused in every case.

OTHER PLANTS.

Lilies. In spite of an unusually wet autumn, there was less stump-rot, due to *Phytophthora parasitica,* in the lily fields than in any of the last three seasons.

Strawberries. In a field of young strawberry plants, heavy infestation by *Aphis gossypii* was found on the leaves and buds.

Antirrhinum. The rust disease did not occur generally in gardens till late in the spring, too late to cause any great damage. Its occurrence was brought to my notice on 18th October on a plant which had survived the summer.

Gladiolus. A hard-rot of gladiolus corms which had been stored over the summer was investigated, but no fungus likely to cause such damage was found. The thrips, *Taeniothrips gladioli,* was seen in Devonshire and Paget, particularly in April, but storing the corms with naphthalene appeared to give good results in reducing this pest.

Petunia. A disease apparently of virus type was seen on petunias in a garden during March, the symptoms consisting of dark concentric rings or targets on the younger leaves. The disease was successfully transmitted to antirrhinums, on which well-defined pale rings were produced, but no obvious symptoms appeared on a garden variety of Nicotiana inoculated at the same time.

FUNGI AND INSECTS COLLECTED.

No time was available for systematic collecting of Bermudian fungi, but three rusts not recorded in Whetzel and Jackson's Rusts and Smuts of Bermuda were encountered, and were provisionally identified as the following:

Puccinia canaliculata (Schw.) Lagerb. uredospores and teleutospores on leaves of *Cyperus esculentus.*

P. Conoclinii, uredospores and teleutospores on leaves of garden *Ageratum.*

Bubakia crotonis (Cooke) Arthur. uredospores on leaves of *Croton punctatus.*

A scale insect found on the grass *Cynodon dactylon* was identified at the Imperial Institute of Entomology as *Odonaspis ruthae,* Kotinsky, a species not hitherto recorded for Bermuda, and two species of thrips taken on palmetto leaves were identified as *Hercinothrips bicinctus* and *Merothrips sp. n?*

RECORD OF MOVEMENTS.

I acted as Director from 20th to 30th June, and was on sick leave from 27th July till 20th August.

Respectfully submitted,

T. A. RUSSELL,

Plant Pathologist.

8th March, 1935.

Report of the Horticulturist, 1934

The Director of Agriculture,

I have the honour to submit my report of the work accomplished and observations made during the year 1934.

Station Grounds. Although it was not practicable to undertake any new developments, routine maintenance work was carried out to the best possible advantage, considering the limitations of funds and labour. Ornamental shrub and flower bed sections were planted out with seasonable annuals, and new species and varieties were added to the permanent collections. The nursery plot proved invaluable for the growing of stock plants and the propagation of the more hardy types of shrubs and trees.

In view of the majority of the fruit trees being old and unfruitful, a reconstruction of the orchards is under consideration; therefore, no conditioning work was undertaken, and fertilisation was suspended in these plots.

Plant Houses. These were maintained as economically as possible. Potting and the general conditioning of plants were undertaken only when necessary. Additional housing accommodation was given to ferns and their allies by transferring the collection to No. 1 glass-house; the old fernery was used to house Orchids, which have increased in number during the past few years. No. 5 glass-house continued to be used for propagation purposes.

Labelling. The acquisition of a Serpent label printing machine proved economical and useful. Several hundred additional plants were labelled with these permanent labels.

Propagation and New Plant Trials. Seed trials of imported and locally gathered plants continued to demand a great deal of time, in consequence of which many important experiments had to be neglected. As mentioned in my report for the year 1932, the exchange of seeds with Botanical Institutes abroad had to be discontinued because of limitations of labour and facilities to cope with the necessary work. This is to be regretted, as one of the primary undertakings of the Horticultural Section of the Department should be the thorough trial of plants from countries abroad.

As far as possible, concentration was directed towards the vegetative propagation of already established hardy, evergreen species; also to indigenous plants and to such materials as will be required for further Station planting and Arbor Society work.

Plants and Seeds Received. The Department is indebted to the Directors and Superintendents of the undermentioned Botanical Stations, and to private donors for their contributions.

The Royal Botanic Gardens, Kew England.
U. S. Department of Agriculture, Washington, D.C.
La Mortola Gardens, Italy.
Prof. Juan Balme, Mexico City.
Mr. Louis J. Phelps.
Mr. E. S. Dunch.
Mr. H. E. D. Smith.
Mrs. E. Guest.

Many other institutions forwarded exchange lists, but advantage could not be taken of their generous offers.

Plants Distributed. Plants were distributed free to Arbor Societies, Government institutions and for sale at Church Bazaars.

Two wardian cases of plants were dispatched to the Royal Botanic Gardens, Kew, England.

The sale of surplus planting material increased over that of last year by approximately 160 per cent. Many new and interesting plants were distributed by this means.

Advisory Work and Publications. Advice on landscaping and planting was frequently given; visits were made to various parts of the Island in this connection. Papers on Roadside Planting and other subjects were read at Garden Club meetings. Instruction on tree pruning was given to the linesmen of the Bermuda Electric Light, Power and Traction Co., Ltd. Plant materials sent in for identification were determined. References to noteworthy plants and instructions on propagation and pruning were compiled for the Agricultural Bulletin. In collaboration with Mr. E. G. Whitbread, Sub-Inspector of Produce, articles on the Flora of Bermuda were submitted and published in the Canada-West Indies Magazine.

Personal and Other Activities. I was absent on vacation leave in the United States and England from 5th May to 5th August.

Secretarial work of the Garden Club of Bermuda was continued at His Excellency's pleasure.

Excursions were made to various localities in order to collect native and indigenous plant material for propagation and herbarium work.

Garden Clubs. These organisations continued their useful work in the community. Jointly with the Bermuda Trade Development Board, the Garden Club of Bermuda staged a three-day Flower Show, Floral Parade and Pageant at the Agricultural Station, during the Easter season. This event proved popular, and was financially successful.

Condition of Bermuda Flora. Observations made throughout the Island showed that the general condition of plants was not as good as might have been expected and that the percentage of young trees, in comparison to matured ones, was exceptionally low. It was furthermore noted that in many instances trees and hedges, which were relied upon for beauty and shade, were in poor condition, whether from want of proper surgical treatment or from treatment wrongly applied.

It is pleasing to record that efforts are being made to thin out Fiddlewood trees from amongst Cedars. These trees, although beautiful in themselves have proved to be injurious to the growth of Cedars.

The season proved to be exceptional for fruit growing. Heavy crops of Avocado Pears, Citrus and other sub-tropical fruits were reported.

Recommendations. As the welfare of the Colony is greatly dependent upon the general condition and care of its flora, special consideration should be given to its preservation and improvement. There are several ways in which this important work could be undertaken, but primary thought should be given to the training of competent gardeners. It is recommended that a practical training course for boys leaving school be instituted at the Agricultural Station, whereby the apprentice would, over a period of not less than two years, receive instruction in the principal practices of gardening. As there are but few skilled gardeners in the Colony at the present time, such a scheme should not fail to find support

among those residents who are now showing keen interest in the horticultural development of their properties. The ultimate results achieved would greatly benefit the Colony at large.

Respectfully submitted,

J. C. NAUEN,
Horticulturist.

7th January, 1935.

Report of the Inspector of Produce, 1934.

The Director of Agriculture,

I have the honour to submit my report for the year 1934.

PACKING HOUSE INSPECTION OF EXPORT VEGETABLES.

Three Government Packing Houses were in operation, under my direction, during the season. No. 1 Packing House, situated at the Agricultural Station, was opened in December, 1933, for the packing of export vegetables. This House remained open throughout the season, closing on 17th July. No. 2 Packing House, also in the Station grounds, was opened in May and utilised solely for the packing of tomatoes. The Southampton Packing House, situated at Evans Bay, was opened to farmers on 23rd April. Vegetables other than tomatoes were received until 28th June, when the shed was closed owing to the reduced quantities of vegetables delivered for packing.

Quantities Shipped. See Director's report.

Comments. The following general remarks are made on the vegetables delivered to the Government Packing Houses.

Beans were of varied quality. Growers should remember that only young, tender beans are marketable.

Beets were fair. Some growers consistently brought in young well-shaped roots, but the majority of lots were mis-shapen and too large. Under present market conditions, it is a mistake to bring in any beets which have been transplanted.

Carrots were generally good, but a fair standard pack is hard to set, by reason of the great difference in quality found in the various lots brought in. Growers should take greater care when washing, and not allow water, which sets up mould, to remain in the barrels of washed roots.

Onions. The onion crop was the worst harvested for many years. Bad weather conditions prevented satisfactory curing, although a few growers, by especial care, brought in some sound, bright lots. The bulk of the crop, however, was of very inferior quality, and a number of lots were rejected as being totally unfit for shipment.

Parsley. A small quantity of parsley was shipped in good condition.

Cucumbers. Very small quantities of cucumbers were brought in for packing. Some were overgrown and 'corky', and growers should realise that only young green cucumbers can be shipped.

Cabbage. A much decreased quantity of cabbage was packed. Taking into consideration the highly perishable nature of this vegetable, it is doubtful if the additional handling incurred by delivery to the Packing Houses is advisable. Growers, when packing on the farm, should pack only good hard heads; soft, prematurely harvested cabbage is unsaleable in Canada.

Tomatoes. The increased importance of tomatoes, as an export vegetable, has resulted in farmers taking much greater care in the growing and handling of this crop. A number of growers consistently brought in lots which were almost free from damaged fruit; this could obviously be done by all if greater care was taken in the preliminary culling on the farm.

Potatoes. The quality of Triumphs was very good. Fifteen per cent of the New York shipments were graded and packed in crates by the Department.

Cobblers. The crop of Cobblers was fair, but blight was prevalent, owing to the wet weather experienced during the growing season. This resulted in a large percentage of 'black-eye rot', especially in lots which had been stored. The cost of packing was considerably increased by this condition, and growers should carefully pick over doubtful lots before delivery.

Garnets were a good crop, and not so much affected by blight as Cobblers.

Other Vegetables. Small quantities of miscellaneous vegetables were received in good condition.

Quantities of Crates on Hand. At the close of the season crate material on hand was sufficient to make up (approximately) :

Bushel crates	20,350
Tomato "	22,150
Cabbage "	2,580

Crate material was imported by the Department, for use in the Packing Houses, throughout the season. A sufficient supply of made-up crates was kept on hand to provide for heavy deliveries, and ten thousand assembled crates were on hand at the commencement of the tomato season.

DOCK INSPECTION OF EXPORT VEGETABLES.

Mr. C. V. S. Early, Assistant Inspector of Produce, was on duty at the dock from 1st January to 30th June.

Comments. The following comments are made on vegetables brought direct to the dock.

Farm-packed Vegetables to New York.

Kale was generally in good condition.

Potatoes. A large crop of Triumphs was harvested and shipped in excellent condition. The yield obtained was far above the average, and the tubers were remarkably free from disease. Garnets were in good condition, and the yield was satisfactory.

Other Vegetables. Small consignments of parsley were shipped in good condition.

Farm-packed Vegetables to Canada.

Carrots were of average quality. A marked improvement in pack was seen in the shipments of a number of growers.

Celery. Although a decreased acreage was grown, the yield was large. The general condition of shipments was good, and disease was found in only a few lots.

Onions were in very bad condition, and many lots were rejected as unfit for shipment.

Cabbage was above average quality.

Tomatoes. Early in the season a very small quantity of farm-packed tomatoes was shipped. The grading and packing were poor, and growers generally decided that they were unable to compete with the Government-Packed machine-sized fruit.

Other Vegetables. Small shipments of beets, parsley and cucumbers were of fair quality.

Produce Rejected (Farm Packed). The following produce was rejected on first inspection. Some was re-packed, and was later passed for shipment.

Beets	3	crates
Cabbage	23	"
Carrots	390	"
Celery	102	"
Onions	132	"
Potatoes	341	barrels
Potatoes	247	crates
Tomatoes	97	"
Kale	19	"
Total	1,354	packages

Appeals. Nil.

Quantities of Produce Shipped. See Director's report.

Prosecutions. Nil.

Supervision of Chill-Rooms. Throughout the season the chill-rooms of the steamers were frequently inspected by Assistant Inspector Early, Sub-Inspector E. L. Adams and myself. Stowage was found to be satisfactory, and the percentage of breakage was small.

Acknowledgment. I wish to record my appreciation of the assistance and co-operation rendered by Mr. P. L. Spurling, Foreman of Messrs. Pearman, Watlington & Company's Cold Storage Plant.

SEED POTATOES IMPORTED

From Canada:	Triumphs	1,809	barrels
	Garnets	1,928	"
	Irish Cobblers	1,096	"
	" "	700	bags
	Green Mountains	30	barrels
From Long Island, U. S. A.	Triumphs	1,773	barrels
	Katahdin	8	"
From Maryland, U. S. A.	Katahdin	85	bags (120 lbs.)

Remarks on Condition. Long Island seed was of good quality, but poorly graded. Canadian Triumphs were of extra good quality, although somewhat large for seed purposes. Garnets and Cobblers were generally good.

CRATE MATERIAL AND COOPERAGE IMPORTED.

Crate material was inspected on arrival, and was found in good condition. Barrel material was also found to be of good quality.

LILY FIELD INSPECTION.

See Plant Pathologist's report.

PACKING HOUSE INSPECTION OF LILY BULBS.

Bulbs were in very good condition, with less disease in evidence than in former years.

FARMERS' MARKET.

The Market has been considerably enlarged during the year, and ten stalls are now available, nine of which were rented at the close of the year. A large variety of produce was on sale at reasonable prices, and business was generally good. The immediate occupation of the new stalls points to the increasing importance of the Market, which is now the recognised centre for those wishing to purchase fresh vegetables.

RECOMMENDATIONS.

(i) It is recommended that all vegetables brought to the Government Packing Houses should be inspected before an inward receipt is issued. Those lots showing a high percentage of 'rejects' should be condemned provisionally, until the grower has re-conditioned them to the Inspector's satisfaction. Facilities for picking over such deliveries should be provided by the Inspector. This recommendation is of primary importance to the efficient and economical working of the Packing Houses. Low quality produce, containing a large proportion of rejects, slows up the grading machine, and consequently the packers cannot be kept working at normal speed.

(ii) It is recommended that potatoes showing a large percentage of 'blackeye rot' should not be accepted in any circumstances.

OTHER WORK.

I made four surveys during the crop season, and duly reported on the same. At the close of the vegetable packing season I attended to the laying up and lubricating of all grading machinery. Periodic visits were paid to the three Packing Houses during the summer. I superintended labour at the Station during the absence of the Foreman in August and September.

Respectfully submitted,

T. ARTHUR HOLLIS,
Inspector of Produce.

Shelly Bay,
30th January, 1935.

Report of the Government Veterinary Officer, 1934.

The Director of Agriculture,

I have the honour to submit my report for the year 1934.

Local Outbreaks of Infectious Diseases. There was an outbreak of distemper among dogs in May—confined to St. Georges and resulting in the death of several dogs.

Importation of Animals. The following domestic live stock were imported:

		Compared with last year	
Horses	105	increase of	31
Dairy cattle	70	" "	10
Pigs	22	decrease of	42
Poultry	9,335	increase of	3,577
Dogs	216	decrease of	2
Miscellaneous	914	increase of	517

All imported pigs were vaccinated against hog cholera.

All other animals not accompanied by proper certificates were treated in accordance with the requirements of the Board's Bye-Laws.

Visits of Inspection. During the year I made 277 visits of inspection to animal quarters on vessels and 326 visits to various parts of the Islands to inspect coolers, inoculate animals in relation to licenses to sell milk, and also for the purpose of making agglutination tests for contagious abortion in cattle. Of 28 animals submitted to the test 6 re-acted, and I am recommending that a Bye-Law be passed making it compulsory for all cattle imported to be tested before shipment. I consider this quite as important as the tuberculin test.

Of 1,330 dairy animals tested for tuberculosis, 19 re-acted to the test. There were about 50 cattle which were not tested, and the number tested was 112 more than in 1933. The owners of cattle now see the advantage of this test, and are asking to have it done. In the four years I have tested cattle in Somerset there has never been a re-action, therefore, I consider Somerset to be the cleanest area in this respect.

Condition of Dairy Stock. The general condition continues to improve. A few scrub bulls still remain.

Farmers' Market. The market was visited weekly, with the exception of two weeks when I was on leave. The condition of the stalls was found much improved. The quality of beef offered for sale was fair; pork, good.

The premises on which animals are slaughtered for sale in the market were in a sanitary condition.

Private Markets. The coolers of the various private markets were inspected frequently and conditions on the whole were satisfactory.

Horse Show. There was no Agricultural Exhibition this year, but the Command Horse Show on the Exhibition grounds was well conducted and patronised.

Issue of Pharmaceutical Material. No material was issued during the year.

Cruelty to Animal Cases. Professional evidence was given in 8 cases prosecuted by the Police Department, a decrease of 6 from the year previous.

Fees. The following fees, approved by the Board of Health on 10th March, 1931, were charged for services performed in my official capacity.

(a) Tuberculin tests of imported cows:
1 cow forty shillings.
2 cows sixty shillings.
3 cows seventy shillings.
more than 3 cows, ten shillings each additional
} of same owner.

(b) Ophthalmic test of imported horses:
1 horse twenty shillings.
2 horses thirty shillings.
more than 3 horses, five shillings each additional
} of same owner.

(c) Anti-hog cholera vaccination of imported pigs:

Initial fee of ten shillings, and one shilling and six pence per pig.
Over twenty pigs of same owner—no initial fee charged.

I was absent on leave from 8th to 24th August, when I attended the Twelfth International Veterinary Congress, held at the Waldorf Astoria Hotel in New York City, from Monday, 13th, to Saturday, 18th August, inclusive. Government representatives were present from fifty-one different countries, and I was honoured by representing Bermuda. There were 1,800 veterinarians present, the largest number to attend an International Veterinary Congress. The next Congress is to be held in Switzerland in 1938.

Respectfully submitted,

C. J. COOPER, V.S.,
Government Veterinary Officer.

Kelton, Pembroke,
30th January, 1935.

Appendix A.

REPORT OF THE BERMUDA BULB TRADE IN EUROPE, 1934.

The past season has been comparatively uneventful, and in many ways has turned out much in accordance with expectation. Most satisfactory features are the continued high quality of the bulbs, and a notable increase in the quantity sold to the Continent. The values realised appear to us to be rather lower than is desirable, but we hardly felt that circumstances were sufficiently favourable for an attempt to raise them. Lately we have been pleased to see an improvement in Japanese Longiflorum prices, which raises a hope that we may be at last approaching the end of the long-continued spell of low values.

The shipments of 1933 turned out remarkably well. There were no complaints, and we received many good reports of the bulbs shipped by all the growers.

Judging from appearance, the 1934 crop is well up to standard. The bulbs looked bright, firm and fresh. We were especially pleased with the grading; it was consistent, and indeed generous. There is nothing pleases a customer more than to see bulbs uniformly above the bare minimum size. While this cannot always be expected, it is well worth while giving generous sizing when it can be managed.

Last year we were obliged to point out the unsatisfactory fixing of the boxes in some shipments, due to the use of smooth nails. We have pleasure in reporting that this matter has been much improved and "sprung" cases were the exception.

Great Britain and Ireland. In Great Britain, the horticultural trade has settled down to the new conditions of tariffs, and the improvement in the domestic business of the country has brought some benefit. Nowadays, the big demand, of course, is for plants which are hardy, perennial, and easily managed. As far as lilies are concerned, there has come into being a class of very well-informed and intelligent amateurs: some of them are, perhaps, over-ambitious in tackling such problems as growing from seed and hybridising, but at least they are keenly interested. These people may not be primarily and exclusively devoted to Harrisii, but it is likely that some are sufficiently interested to wish to grow them alongside other more novel kinds of lilies. Unfortunately many who would like to cultivate under glass are deterred by the expense: and conditions will have to alter very much before we can hope to see again the large private glasshouses, with the necessary paid labour, which used to be a feature of many country estates.

If general conditions improve, there is reason for thinking that the demand for Bermuda bulbs will grow in proportion. In the meantime, the position is being maintained, although the number of bulbs sold in Great Britain itself is slightly smaller this year. Our sales in Ireland were disappointing, but the decline is understandable and due to depressed conditions.

Continent of Europe. During the last few years we have given attention to the Continent of Europe. Unfortunately it is either impossible, or very risky, to attempt business with many countries in their present state. In Germany, for example, we had made some connections, and we could have sold some bulbs there; but there is now no means of obtaining payment. The future in France is rather dubious, and sales were on a very small scale, to certain old customers.

The bright spot in Europe has been the Swedish market. Three years ago Bermuda bulbs were unknown, and we sent samples for testing, because we did not know how they would grow so far North. Evidently the results were satisfactory, and we obtained a fair order in 1933. The quantity this year was on a much greater scale, and Sweden took over 100 cases. The expense of conveyance was rather heavy, but has been fairly well covered in the prices; except in the case of one of the remoter ports, for which extra allowance will be made next year.

As a result of this new trade, the total sales for the whole of Europe are the largest we have made since the trade was resumed after the interval of the War.

Japanese Trade. We have already alluded briefly to the higher prices for Japanese Longiflorum. As the Board knows, for several years past the Japanse have been flooding this market with immense quantities of bulbs which have been sold at ridiculous prices. There has never been any question of actually competing with them, but it could not be entirely ignored. It has, in fact, resulted in our being obliged to sell at the lowest figures acceptable to the Bermuda growers; and, even so, we have lost trade amongst customers to whom price is a prime consideration.

This season the quantities from Japan are much smaller. Two weeks ago, for instance, one of the largest importers stated in our hearing that he had only 3,000 cases Longiflorum Giganteum coming forward this season, compared with 5,000 in 1933. Prices at auction rose last week from 45/- to 52/6 per case. With duty added, Japanese standard cases contain half as much again. Anyhow, it is a move in the right direction, and we earnestly hope it may prove to be a sign that our competitors are beginning to understand that cut-throat competition is not sound.

This year the Japanese made a big effort to bring their Formosum in very early. Actually Bermuda bulbs arrived just ahead of them, which was fortunate. We had asked the growers to get their shipments off in July, and we are pleased to say that the majority responded. One effect of the early arrival of Formosum was that we did not receive so many late enquiries as in former years. It is important to maintain the advantage gained from being known as "the first in the market". And, if the Japanese persevere in their attempt to dispute this title, it may be difficult for us to pass any large share of our orders to growers who are unable to ship by the earliest opportunity.

Advertising. We re-printed the Leaflet, and arranged the distribution of 33,000 copies. Press advertising has been well maintained, in both trade and gardening papers; also in various other suitable publications, such as the Royal Horticultural Society's Lily Year Book, and the Trade Diaries. Mr. Burn carried on his valuable and well-organised scheme of bulb presentations to Horticultural Societies, which induced a number of enquiries.

Plants were successfully grown at Kew Gardens, and in Hyde Park. A very good stand of Bermuda lilies was put up at one of the Royal Horticultural Society meetings in London, by arrangement with Messrs. James Carter and Co. At the end of August, a table of dry bulbs was staged at the Royal Horticultural Society meeting.

ROBERT TUCKER AND CO.

London,
22nd November, 1934.

Appendix B.

DISPOSAL OF PRODUCE, 1934.

Milk to King Edward VII Memorial Hospital	£12 18 0
Vegetables to Hospital and other institutions	20 19 2
Total	£33 17 2

N. B. Most vegetables were shipped to Canada, experimentally chiefly.

Appendix C.

RAINFALL RECORDED AT AGRICULTURAL STATION, 1934.

January	4.01 inches
February	4.07 "
March	2.79 "
April	9.93 "
May	2.91 "
June	2.81 "
July	5.77 "
August	7.77 "
September	5.46 "
October	2.01 "
November	4.03 "
December	5.11 "
Total	56.67 inches

RAINFALL FOR LAST FIVE YEARS.

1929	60.62 inches
1930	59.20 "
1931	50.67 "
1932	53.32 "
1933	46.22 "

C. V. S. EARLY,

Station Foreman.

1st. February, 1935.

APPENDIX D.

FINANCIAL STATEMENTS

(a) EXPENDITURE (EXCLUSIVE OF SALARIES) FOR THE YEAR ENDED 31ST DECEMBER, 1934.

PERSONAL EMOLUMENTS

Fees to Members of Board

Appropriated by Act No. 48 of 1933				£	70	0 0
" " Resolve No. 12 of 1934					30	0 0
Paid to members for attendance	£	86	0 0			
Unexpended balance		14	0 0			
	£	100	0 0	£	100	0 0

Rent Allowance to Plant Pathologist.

Appropriated by Act No. 48 of 1933				£	100	0 0
Paid to Plant Pathologist	£	100	0 0			
	£	100	0 0	£	100	0 0

Assistant Inspector of Produce.

Appropriated by Act No. 48 of 1933				£	200	0 0
Paid in monthly wages	£	195	0 0			
Unexpended balance		5	0 0			
	£	200	0 0	£	200	0 0

Sub-Inspectors of Produce.

Appropriated by Act No. 48 of 1933				£	500	0 0
Paid in daily wages	£	472	12 0			
Unexpended balance		27	8 0			
	£	500	0 0	£	500	0 0

OTHER CHARGES

General Grant

Appropriated by Act No. 48 of 1933				£1,600	0	0
Labour on experimental plots, lawns, flower beds, glasshouses, and drives, and care of live stock	£1,137	8	0			
Prison labour	9	2	0			
Cartage and ploughing	100	18	4			
Manure and fertilisers	19	4	8			
Seed potatoes and other seeds	53	15	1			
Live stock—feed, bedding and incidentals	136	4	5			
Repairs and renewal of buildings, tools, etc	84	3	2			
Ethylene chlorhydrin for potato germination experiments	1	2	0			
Printing monthly bulletins	50	0	0			
Office supplies	4	17	10			
Subscriptions to agricultural periodicals and purchase of books	3	4	2			
Unexpended balance	...	...	4			
	£1,600	0	0	£1,600	0	0

Inspection Services, Market Investigations and Contingencies.

Appropriated by Act No. 48 of 1933				£1,000	0	0
" " Resolve No. 12 of 1934				60	0	0
Inspection of vegetables at dock and at Packing Houses	£ 169	2	9			
Representation in Canada	392	16	2			
Advertising in Canada	60	15	7			
Advertising lily bulbs in England, including cost of bulbs and fee to representative	93	17	0			
Inspection of seed potatoes on Long Island	34	1	2			
Vegetables supplied to Canadian Vegetable Jobbers' Banquet	13	16	5			
Adding machine	35	11	0			
Tomato juice extractor	3	5	0			
Experimental shipments to England	5	1	3			
Repairs and additions to Farmers' Market	39	8	1			
Steel stakes for tomato plots	12	5	10			
Experimental shipments to British Columbia	70	2	9			
Printing	25	2	0			
Cables	97	7	3			
Subscriptions to marketing periodicals	7	4	3			
Unexpended balance	...	3	6			
	£1,060	0	0	£1,060	0	0

Eradication of Animal Diseases.

Appropriated by Act No. 48 of 1933				£ 75	0	0
" " Resolve No. 17 of 1934				88	0	0
" " " No. 24 of 1934				23	0	0
Compensation to owners of condemned stock	£165	0	0			
Attendance of Government Veterinary Officer at International Veterinary Congress	15	0	0			
Supplies and contingencies	5	17	3			
Unexpended balance	...	2	9			
	£ 186	0	0	£ 186	0	0

Control of Plant Diseases and Pests.

Appropriated by Act No. 48 of 1933				£150	0	0
Labour	£ 76	9	3			
Fungicides and insecticides	55	18	4			
Equipment	15	16	0			
Subscriptions to pathological periodicals	6	12	4			
Printing	15	0	2			
Unexpended balance	...	3	11			
	£150	0	0	£150	0	0

Horticulture.

Appropriated by Act No. 48 of 1933					£	50	0 0
Labour	£	3	5	0			
Repairs to mower		10	13	0			
Seeds, plants and bulbs		20	6	1			
Labelling machine and labels		15	13	8			
Unexpended balance		...	2	3			
	£	50	0	0	£	50	0 0

Departmental Contingencies, Travelling Expenses, Telephones, Lighting, Etc.

Appropriated by Act No. 48 of 1933					£	120	0 0
Local travelling expenses	£	13	1	8			
Stationery and printing		48	18	10			
Foreign postage		12	12	4			
Lighting and power		11	8	5			
Telephones		24	16	0			
Part cost of safe		9	0	0			
Unexpended balance		...	2	9			
	£	120	0	0	£	120	0 0

The Agricultural Mission Expenses Resolve.

Appropriated by Resolve No. 18 of 1934					£	500	0 0
Expenses of deputation	£	286	4	5			
Unexpended balance		213	15	7			
	£	500	0	0	£	500	0 0

The Palmetto Scale Investigation Resolve.

Appropriated by Resolve No. 8 of 1934					£	200	0 0
Unexpended	£	200	0	0			
	£	200	0	0	£	200	0 0

Packing House, Services and Contingencies.

Appropriated by Act No. 48 of 1933							£4,000	0	0
" " Resolve No. 24 of 1934							640	0	0
New machinery and installation				£142	15	3			
Packing House supplies:									
Labels	£328	11	5						
Paste	38	18	5						
Nails	72	1	5						
Liners	49	16	10						
Wrappers	107	16	7						
Bags	11	4	2						
Packing House contingencies:									
Rubber stamps	15	4	0						
Printed forms	44	1	2						
Finger cots, etc	4	12	5	672	6	5			
Labour: Pasting labels, making crates, grading, packing, etc				1,869	9	4			
Electric current—light and power				52	19	11			
Telephones (2)				5	10	0			
Rents: B. store, Hamilton dock	£25	0	0						
Southampton Packing House site	12	0	0	37	0	0			
Cartage of packed vegetables:									
from Station	£473	16	11						
from Southampton.	267	5	10						
from cold storage	83	16	0	824	18	9			
Cartage and wharfage of crate material				104	0	11			
Cold storage, chiefly of tomatoes				395	18	6			
Surplus of crate material purchased during 1934 and carried over				531	0	8			
Unexpended balance				...	...	9			
				£4,640	0	0	£4,640	0	0

(b) REIMBURSEMENTS TO GOVERNMENT.

Sale of vegetables					£	89	0 9
" " vegetable plants						6	9 0
" " decorative plants						49	19 9
" " live stock						37	10 0
" " Spraying material						..	15 9
Live stock fees						34	6 0
Lily certificates						1	0 2
Seedsmen's licenses						1	10 0
Packing House receipts:							
Charges for grading and packing	£1,737	3	3				
Charges for material and labour on crates	415	8	9				
Cartage from Southampton	167	14	0	2,320	6	0	
				£2,409	6	9	

(c) FARMERS' MARKET.

Received for hire of stalls				£173	8	11
Rental of market	£144	17	2			
Lighting	28	11	9			
	£173	8	11	£173	8	11

HILDA C. LINES,
Clerk, Board of Agriculture.

4th March, 1935.